

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A method for reducing restriction of blood flow in a lumen of a blood vessel caused by an intraluminal plaque therein, the method comprising:
 - (a) inserting an imaging guidewire into the lumen of the blood vessel to the intraluminal plaque, said imaging guidewire capable of generating a cross-sectional image of the lumen;
 - (b) propelling a catheter including a working head over said imaging guidewire towards said intraluminal plaque until said catheter reaches a distal end of said guidewire;
 - (c) scanning the lumen with said imaging guidewire to generate said cross-sectional image of the lumen;
 - (d) positioning said catheter in the lumen by actuating at least one positioning element;
 - (e) monitoring said cross sectional image to ascertain that said working head is positioned at a desired location with respect to said proximal end of the intraluminal plaque; and
 - (f) operating said working head to remove at least a portion of the intraluminal plaque.
2. (original) The method of claim 1, further comprising repetition of (c) through (f).

3. (original) The method of claim 2, iteratively repeated until the restriction in the lumen has been reduced to the desired degree.

4. (original) The method of claim 3, further comprising advancing the catheter in the lumen.

5. (original) The method of claim 4, iteratively repeated until said working head traverses said intraluminal plaque.

6. (original) The method of claim 1, wherein said intraluminal plaque is of a type selected from the group consisting of a primary atherosclerotic lesion, a lesion caused by restenosis, a lesion residing at least partially within a previously implanted stent, a lesion situated in close proximity to a bifurcation of the lumen of the blood vessel, a vulnerable plaque and a lesion which totally occludes the lumen of the blood vessel.

7. (original) The method of claim 1, wherein said working head includes at least one cutting edge which is operative only when said working head moves rotationally.

8. (original) The method of claim 1, wherein said at least one positioning element includes at least one balloon which circumferentially surrounds at least a portion of said catheter.

9. (original) The method of claim 1, wherein said at least one positioning element includes at least one set of at least three balloons in a single cross sectional plane of said catheter.

10. (original) The method of claim 9, further including at least one additional set of at least three balloons in a single cross sectional plane of said catheter.

11. (original) The method of claim 1, wherein said inserting, propelling, scanning, positioning, monitoring, operating are subject to control by a single central processing unit (CPU).

12. (original) The method of claim 11, wherein said single CPU is further subject to input by a physician operator thereof.

13. (original) The method of claim 1, wherein said operating said working head begins prior to a traverse of the plaque by said working head.

14. (original) The method of claim 1, wherein said operating of said working head includes rotating said working head at a speed of 1 to 100 RPM.

15. (original) The method of claim 1, wherein said operating of said working head includes rotating said working head at a speed of 5 to 50 RPM.

16. (original) A system for reducing restriction of flow in a lumen of a blood vessel caused by an intraluminal plaque therein, the system comprising:

- a) an imaging guidewire insertable in the lumen of the blood vessel, said imaging guidewire capable of generating digital data which describe a cross-sectional image of the lumen and communicating said digital data to

- a central processing unit (CPU) and further capable of guiding a catheter to the intraluminal plaque without traversing the plaque;
- (b) said catheter including a working head, said working head designed and constructed to remove at least a portion of the intraluminal plaque;
- (c) at least one positioning element integrally formed with, or attached to, said catheter, said at least one positioning element designed and constructed to position said working head within the lumen of the blood vessel;
- (d) said CPU designed and configured to:
 - (i) accept input from a physician;
 - (ii) to receive said digital data which describe said cross-sectional image of the lumen and transform said digital data into said cross-sectional image displayable upon a display device;
 - (iii) operate actuators which control components of the system; and
 - (iv) control operation of said positioning element by means of at least one of said actuators; and
- (e) said actuators, subject to control by said CPU and including:
 - (i) at least one positioning element actuator responsible for the control of said at least one positioning device.

17. (original) The system of claim 16, wherein said CPU is further designed and configured to perform at least one action selected from the group consisting of:

- (iv) to rotate said guidewire within said catheter by means of said actuators; and
- (v) control operation of said working head.

18. (original) The system of claim 16, wherein said CPU further includes at least one item selected from the group consisting of a display device and a data input device.

19. (original) The system of claim 16, wherein said actuators further includes at least one additional actuator designed and constructed to perform at least one action selected from the group consisting of:

- (ii) longitudinally reciprocate and rotate said working head;
- (iii) advance said catheter within the lumen;
- (iv) rotate said guidewire within said catheter; wherein said actuators are subject to control of said CPU.

20. (original) The system of claim 16, wherein said working head operates intermittently as said catheter traverses said intraluminal plaque.

21. (original) The system of claim 16, wherein said working head includes at least one cutting edge which is operative only when said working head moves rotationally.

22. (original) The system of claim 16, wherein said at least one positioning element includes at least one balloon which circumferentially surrounds at least a portion of said catheter.

23. (original) The system of claim 16, wherein said at least one positioning element includes at least one set of at least three balloons in a single cross sectional plane of said catheter.

24. (original) The system of claim 23, further including at least one additional set of at least three balloons in a single cross sectional plane of said catheter.

25. (original) The system of claim 16, wherein operation of said working head begins prior to a traverse of the plaque by said working head.

26. (original) The system of claim 16, wherein operation of said working head includes rotating said working head at a speed of 1 to 100 RPM.

27. (original) The system of claim 16, wherein operation of said working head includes rotating said working head at a speed of 5 to 50 RPM.

28. (original) The system of claim 16, wherein said imaging guidewire further includes a folding mirror and wherein said catheter is positionable upon said guidewire so that only said folding mirror protrudes from said working head in a direction facing the plaque.

29. (original) The system of claim 16, wherein an Archimedes screw is further incorporated into the design of said imaging guidewire in order to facilitate removal of at least a portion of the plaque.

30. (original) The system of claim 16, wherein said catheter includes at least one therapeutic lumen.

31. (original) The system of claim 16, wherein said catheter includes a central vacuum lumen.